



ALL-SKY MEDIUM ENERGY GAMMA-RAY OBSERVATORY EXPLORER

Improving the transient sensitivity of AMEGO-X using single-site events

Henrike Fleischhack on behalf of the AMEGO-X team

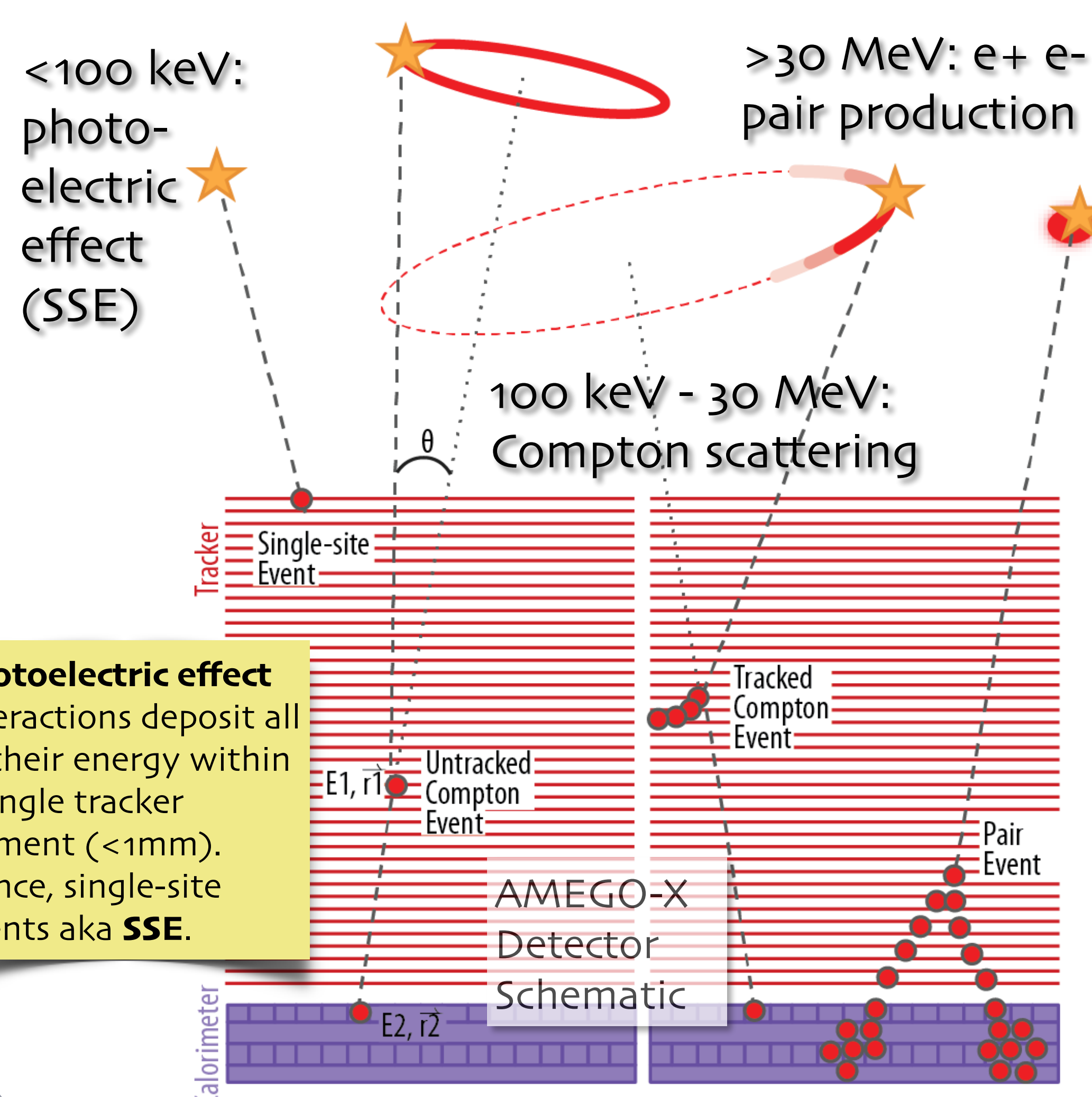
Catholic University of America/NASA Goddard Space Flight Center/CRESST II.

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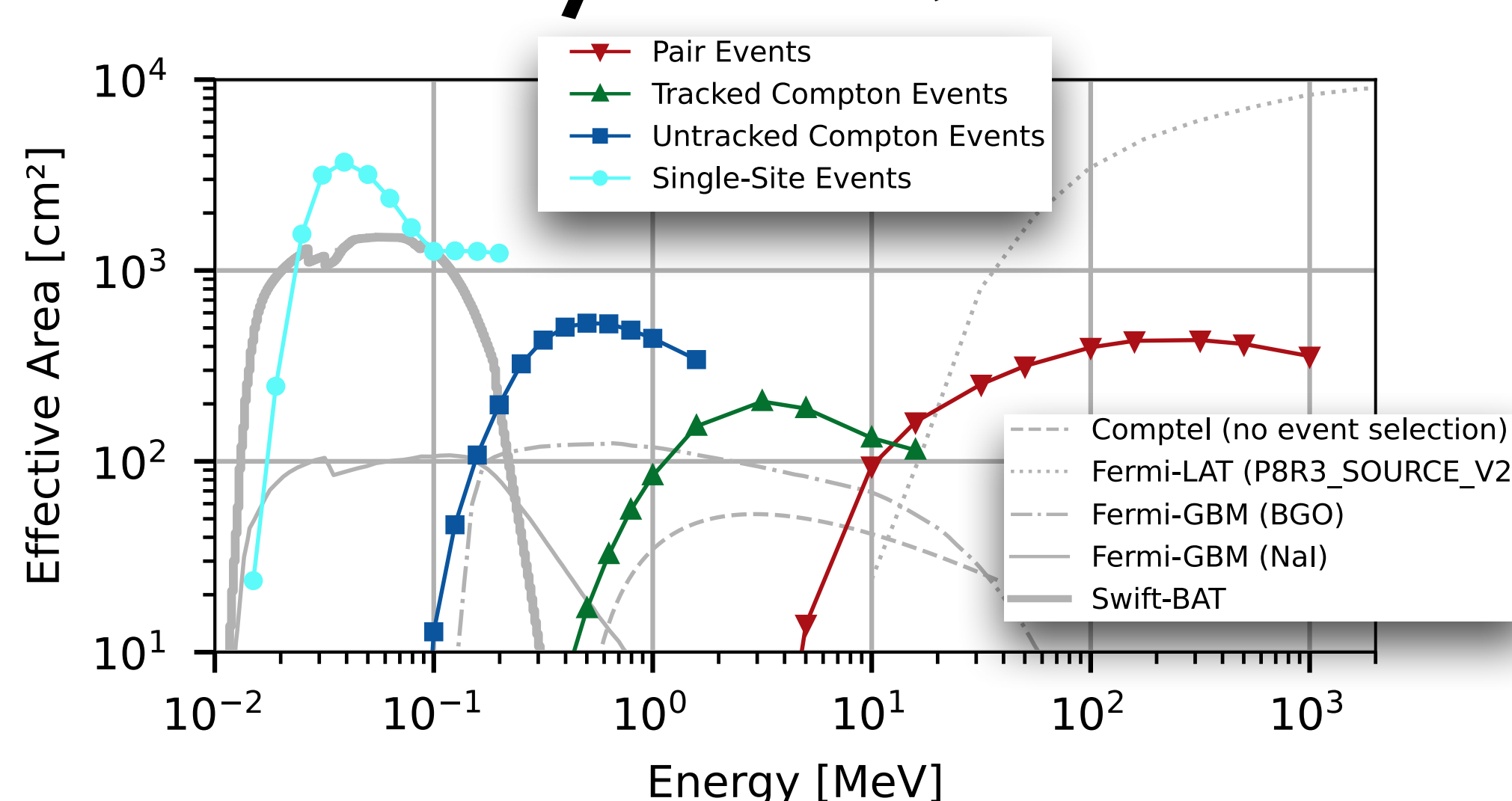
Abstract

AMEGO-X is a Compton/pair gamma-ray telescope, submitted to NASA's 2021 MDEX AO, which will image and survey the medium-energy gamma-ray sky between 100 keV and 1 GeV. It is designed to detect and characterize gamma-ray emission from multi-messenger sources. On short time scales (<100s), including information from single-site events (photoelectric effect interactions) significantly increases AMEGO-X's sensitivity and lowers its energy threshold down to 25 keV. In this presentation, we will present AMEGO-X's sensitivity to transient events such as gamma-ray bursts and magnetar giant flares, and discuss the improvements due to the inclusion of single-site events. We will also discuss AMEGO-X's ability to localize transient sources and alert the community for follow-up observations.

Photons <100 keV Mainly Interact via the Photoelectric Effect

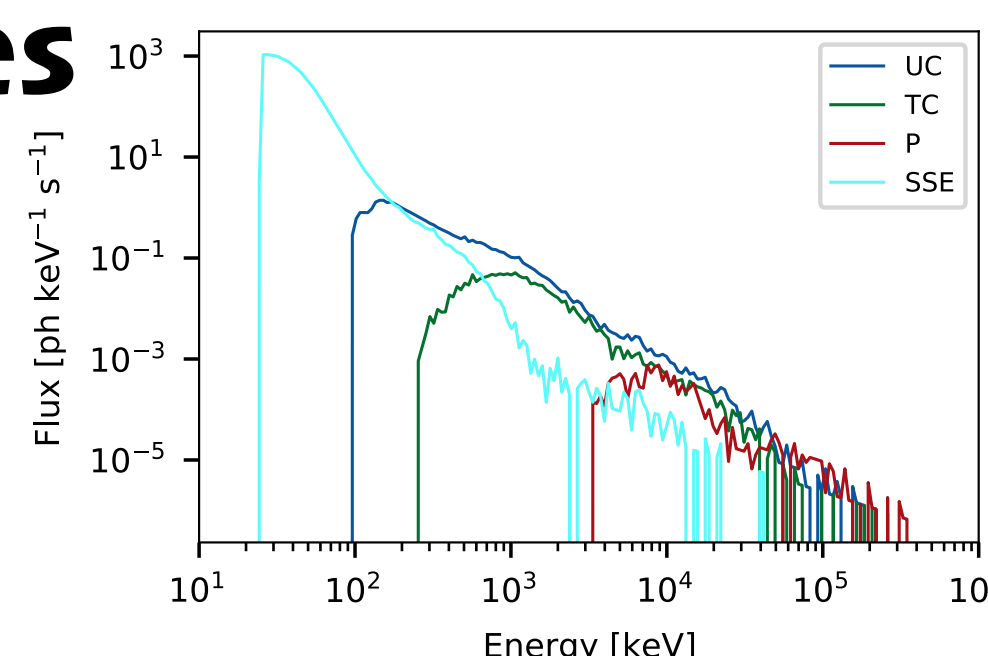


SSE readout increases the effective area & gives AMEGO-X sensitivity <100 keV ...

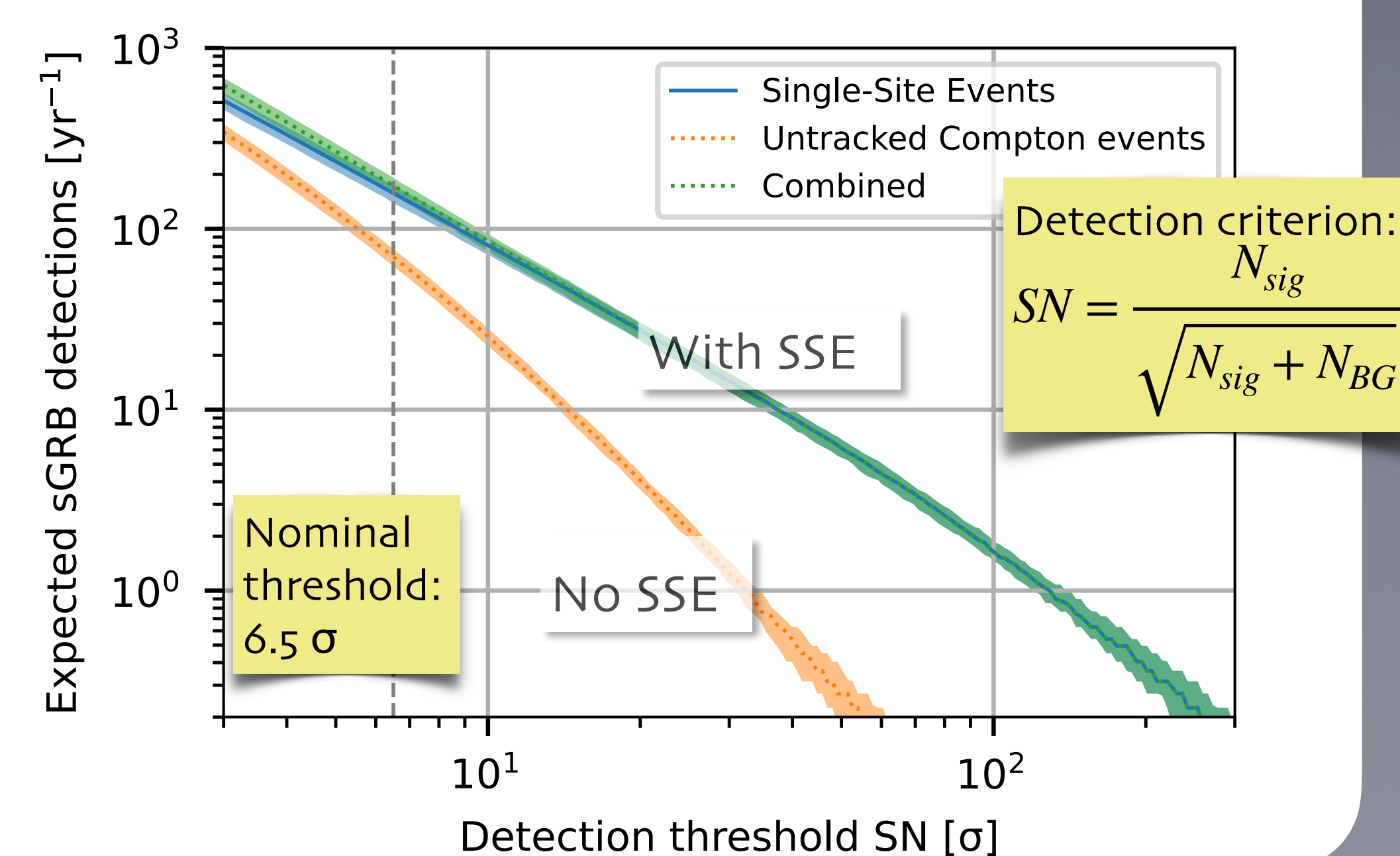


... at the cost of much higher background rates

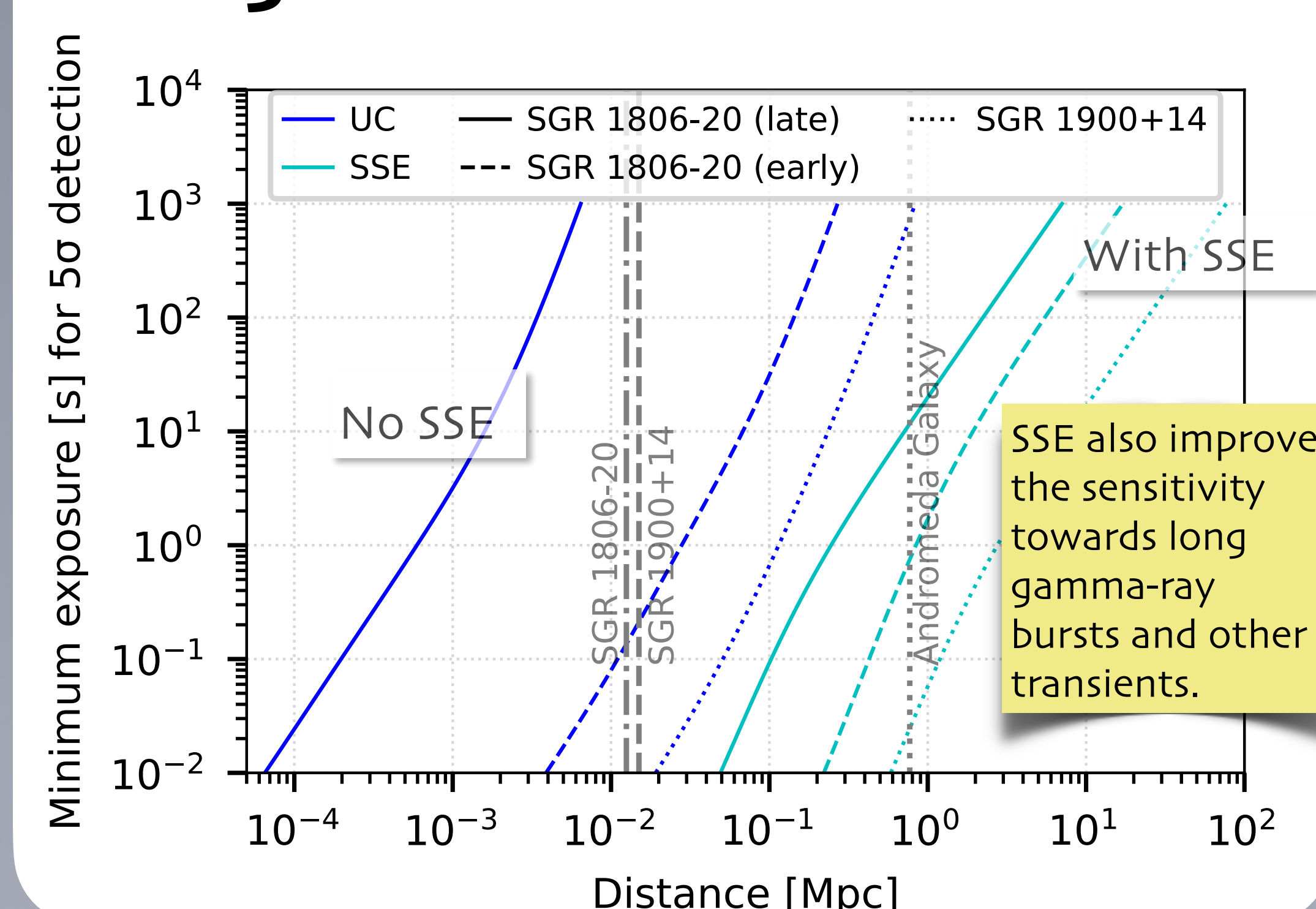
The background rate for single-site events is too high to downlink all of them. The hit information is continuously read out and kept in a 2-minute buffer. It is only transmitted to ground if a rate increase is detected.



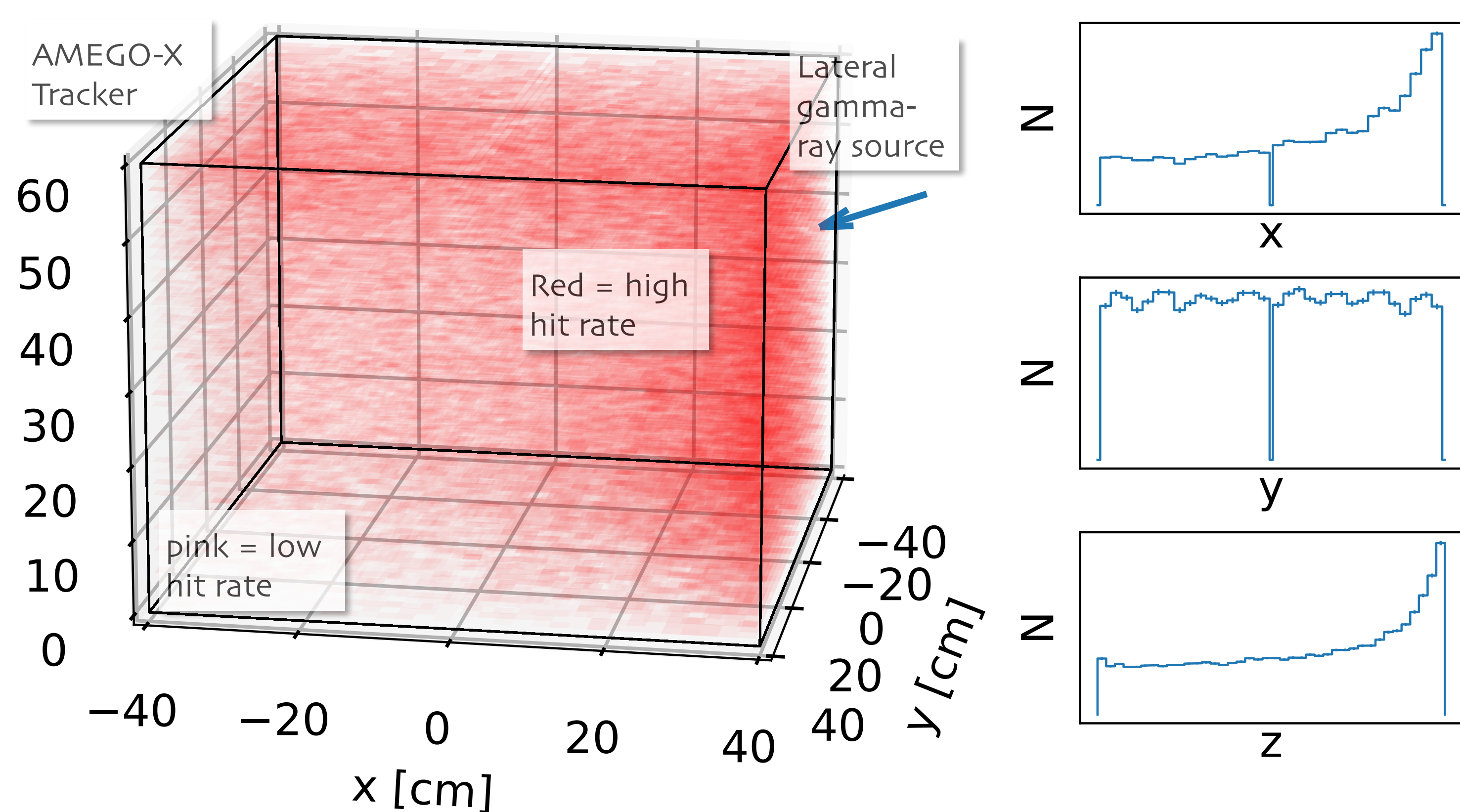
SSE readout more than doubles the detection rate of short GRBs:



SSE allow AMEGO-X to detect extragalactic MGF tail emission:

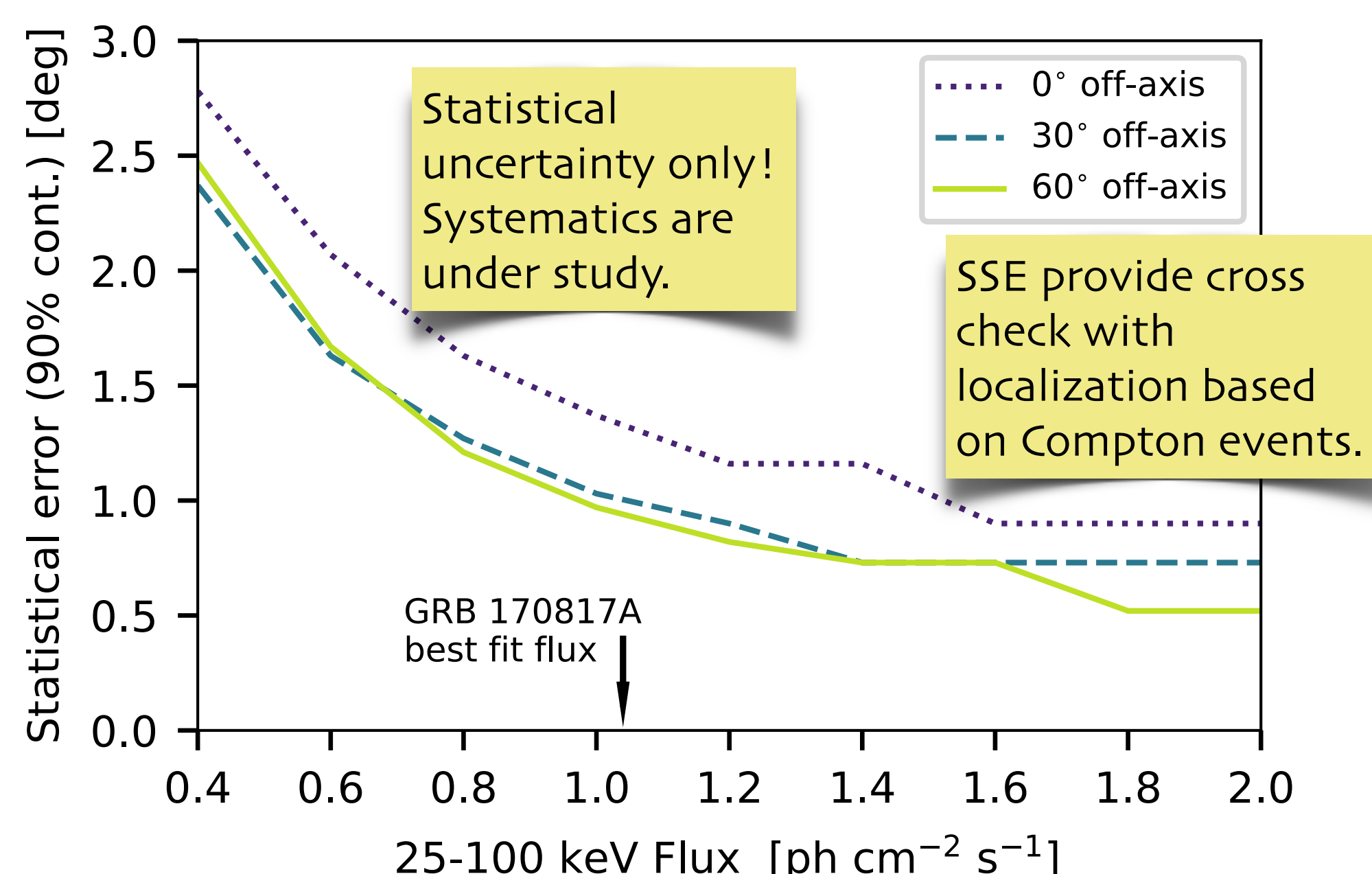


SSE do not provide direction reconstruction on an event-by-event basis. The spatial distribution of hits in the detector depends on the location of the gamma-ray source, enabling us to reconstruct the position of bright transients which briefly outshine any other gamma-ray sources.



Read our paper!
<https://arxiv.org/abs/2111.09209>

GRBs can be localized to within a few degrees, using SSE only:



Also at this meeting:

Mission posters

108.49, Science overview
108.50, GRB localization
108.51, Mission and instrument design

Science posters

106.12, AGNs as Multi-messenger sources
106.38, TXS 0506+56 flare
109.09, CR accelerators

Talks:

Wed., 2:45 PM, 204.06, AstroPix silicon tracker
Thurs., 2:00 PM, 404.03, Mission overview

Acknowledgements

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Many thanks to the AMEGO-X science team!

